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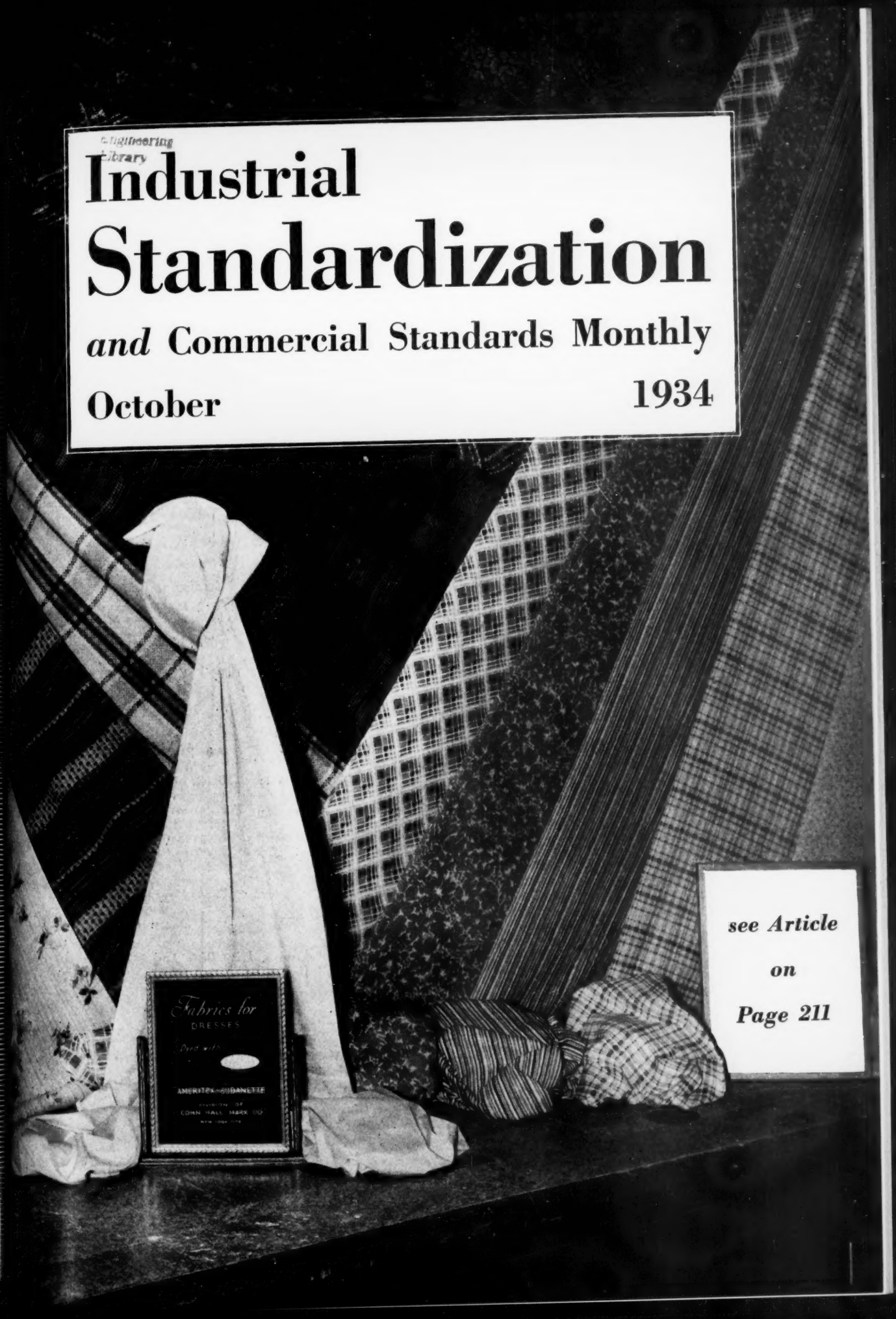
October 1934



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AMERICAN STANDARDS ASSOCIATION

ASA MEMBER-BODIES

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OCTOBER 1934

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Vol. 5 No. 10

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Standard Test Methods Initiated By Silk and Rayon Manufacturers

by
H. A. Mereness

Director, Technical Bureau
National Federation of Textiles, Inc.

Believing that across-the-counter purchasers of silk and rayon, as well as silk and rayon garment manufacturers, want to know what quality of materials they are buying, the National Federation of Textiles, Inc.[1] has undertaken to establish Standard Methods for the Determination of Shrinkage, Slippage, and Dye Fastness to Washing.

Ten laboratories, representing manufacturers, Government bureaus, retailers, and consumers, have cooperated in this work, which is part of a progressive research campaign initiated in 1933 by the National Federation of Textiles, Inc. looking toward a solution of some of the problems that cause consumer dissatisfaction with garments and yard goods. All of the available data from previous researches and experiments were collated, and the committee proceeded with additional tests and studies to reduce the test method to the simplest basis possible so as to make the standards generally acceptable and easy to use.

Consumer Satisfaction

When research was started, it was realized that deterioration of fabrics from exposure to light and perspiration, weighting, fugitive dyes, and dry-cleaning problems, all have a marked effect upon service and consequently upon user satisfaction. Solution of the problems of shrinkage, slippage, and color fastness, however, promised to offer the consumer more satisfaction in a shorter period of time than could be obtained by attempting immediate solution of the other problems. As a first step, therefore, attention was concentrated on methods for determining the limits beyond which shrinkage, slippage, or loss of color could not be allowed because of consumer dissatisfaction, or below which manufacturers could not go without excessive expense.

[1] Formerly the Silk Association of America, Inc.

Control of shrinkage of silk and rayon fabrics and garments is a difficult problem technically, but control is essential if the user is to be satisfied. In general, only one class of silk and rayon goods causes the launderer trouble through excessive shrinkage, but that one class, crepes, is one of the most important dress fabrics.

In crepes, the contraction and elongation of the threads, to which the fabric owes its characteristics, name, and popularity, are responsible for its shrinkage. A crepe which did not shrink might still be called a crepe, but the wearer would soon discover its less desirable qualities and refuse it. In addition to the crinkly appearance, which is pleasing to the eye, a crepe garment allows a greater freedom of movement due to its elastic properties. This creping allows the construction of a relatively heavier fabric than in the case of a non-creping material.

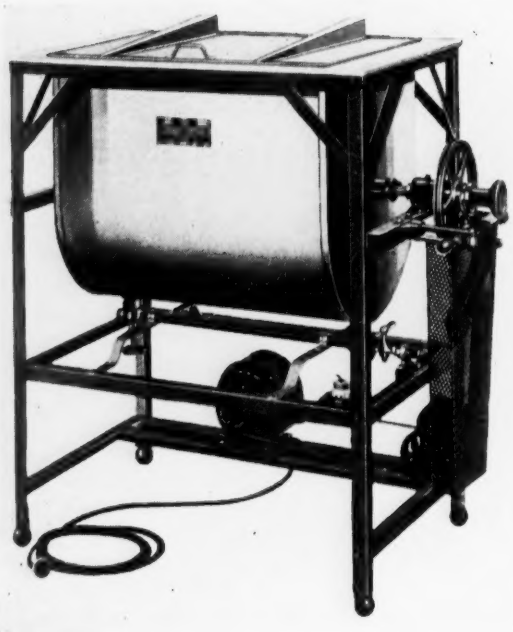
How to Control Shrinkage

The shrinkage of dress fabrics can be controlled by the following procedure:

First, set up a Standard Shrinkage Test for silk and rayon fabrics.

Second, set limits of allowable shrinkage for different classes of fabrics according to their uses. This will prevent unscrupulous manufacturers from producing goods which have been overstretched on the tenter. If goods woven in a 45-inch width shrink normally to 39 inches when being finished, it is quite evident that the same piece could not be finished to 42 inches and still be satisfactory for making into garments. The excessive stretch put in the goods originally will become excessive shrinkage when the fabric is first laundered.

Third, educate the ultimate purchaser to the necessity of taking certain precautions in laundering these fabrics. For example, in laundering crepes the garment should be measured before washing and stretched to its proper size after washing. Exact knowledge of how to press such fabrics is also necessary.



Exterior view of the Launder-Ometer, a laboratory washing machine for making reproducible tests of textiles, soaps, detergents, etc. The author discusses its use in determining shrinkage of silk and rayon fabrics.

Of the steps just mentioned to control shrinkage, activities of the National Federation of Textiles have so far been centered on the development of a shrinkage test, essential before consideration can be given to specifications for allowable amounts of shrinkage in silk and rayon fabrics. The third step has been the subject of an accelerated campaign by women's organizations, manufacturers of fabrics and garments, retailers, technical and women's journals, as well as by the Federation for several years.

Early in the study of the methods that might be followed to determine shrinkage, it became evident that laboratory procedures already developed for cotton and other fabrics did not seem to meet requirements of silk and rayon broad goods, especially for the lighter weights of these fabrics. Naturally, experiments, employing the procedures specified in the Federal Specifications for Test Methods of Textiles (CCC-T-191),[2] were made. The use of the wash wheel as recommended in the above procedure, however, was found to tangle and stretch light-weight materials.

A further investigation indicated that the Launder-Ometer, an apparatus used by laboratories for washability tests, would be quite suitable for determining shrinkage of silk and rayon fabrics. In operation, it was found that the test pieces were not damaged and came out of the machine in a condition similar to that which would follow a mild washing by the average housewife. For ironing such fabrics, the flat-press ironer has been specified, as it was found that uniform results could not be obtained by hand ironing.

In order to use the Launder-Ometer it was also found necessary to change the size of the sample recommended for use in the cotton shrinkage test, reducing the size of the silk sample used from the minimum of 20 x 20 inches recommended for the cotton test to 10 x 10 inches for the silk test. The smaller sample makes the test for silk materials much more economical, also, because silk fabrics are far more expensive than the cottons.

The running time in the Launder-Ometer, a total of 20 minutes, yields results on the shrinkage of most silk and rayon fabrics comparable with the results obtained by other test methods. It has been

Proposed Method for the Determination of Shrinkage in Silk and Rayon Broad Goods

1. Sample

The area tested shall be 10 by 10 inches, with a one-inch margin, each test sample to be cut individually to a 12 by 12 dimension.

No part of the area measured for test shall be taken from within 2 inches from the selvage

The part measured shall be outlined by marking with indelible ink or by a thread sewn into the cloth.

2. Method of Washing

The sample shall be treated in the Launder-Ometer, in 300 cc of a one-half percent neutral soap solution, for 15 minutes at a temperature of 100 deg F. Remove from the jar and rinse by dipping in water at 100 deg F (do not squeeze). Place in the jar with 300 cc of fresh water and rinse for 5 minutes at 100 deg F. Remove from the machine and without squeezing lay on a flat tray, or other flat surface, and keep in a horizontal position until the great excess of water has evaporated. Wrinkles can be removed by laying the sample on a stone slab and pressing with the palm of the hand.

3. Method of Pressing

The samples shall be pressed while still appreciably damp in a Flat-press (G. E. Flatplate Ironer or similar is satisfactory) at a temperature between 275 and 300 deg F, being careful to press only long enough to remove the moisture.

4. **Condition** two hours or longer at ordinary atmospheric conditions.
5. **Measure** each side of each piece at three places:
   1. At the middle
   2 and 3. At each end
   Average all measurements for each dimension.
6. **Report** shrinkage in Warp and Filling in percentage of original 10-inch dimension.

[2] See page 218.

found that on some heavy fabrics no amount of treatment in the Launder-Ometer will give the maximum shrinkage obtained by hand washing methods. Details of the test are given in the box.

Submittal of the proposed shrinkage test to Committee D-13 on Textile Materials of the American Society for Testing Materials for further development is being considered.

The Launder-Ometer Test Method sets up procedures almost identical with those of a tentative method for testing dye fastness to washing, developed entirely independently. It is believed that both tests will measure the changes which take place in silk and rayon during the average life of these fabrics.

Silverware Trade Quality Standards

The National Recovery Administrator announced approval of certain quality standards applying to plated flatware and hotel flatware under the Code of Fair Competition for the Silverware Manufacturing Industry.

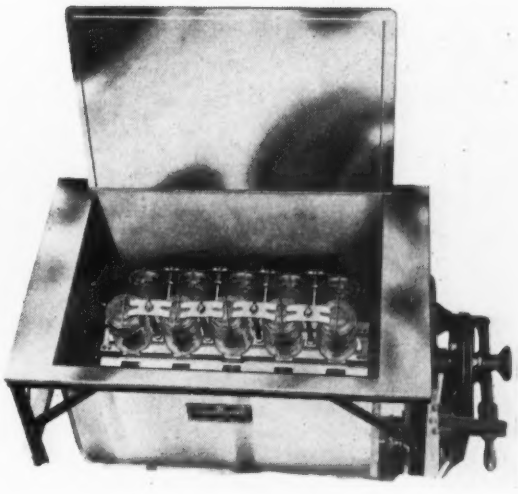
The Code provides that within 60 days after the effective date of its approval there shall be established a series of quality standards to mark the various grades and qualities of the products of the industry, and it is in pursuance of the action of the Code Authority in this respect that the order of approval has been issued by the Administrator.

The order further requires that within 30 days the Code Authority shall circularize all known members of the industry, and within 60 days shall cause to be published in at least two trade journals a notice of the standards and shall request that all manufacturers, dealers, and retailers give full publicity to these standards in order that the ultimate consumer may become familiar with the connotation of the various grade markings.

The Administrator in another order has approved a cost accounting system for the same industry.

Australians Are Seeking Wire Net Simplification

The Standards Association of Australia, which has done good work in standardizing sizes of electrical fittings and power-points, etc., is turning its attention to rabbit-proof wire nettings. It is cooperating with landmen and manufacturers to evolve a standard mesh and gauge. Australian manufacturers have over 550 varieties of netting on their lists.—*Bulletin, Sydney, Australia, May 9.*



The Launder-Ometer with top open, showing individual testing jars. This machine has 20 such jars.

A.S.M.E. Elects New Officers

Ralph E. Flanders, president, Jones & Lamson Machine Company, member of the Industrial Advisory Board of the NRA and of the Business Advisory and Planning Council, has been elected president of the American Society of Mechanical Engineers. He is a national authority on machine design and construction, representing the A.S.M.E. on the Sectional Committee on Standardization and Unification of Screw Threads since 1921, and serving as chairman since 1930. Mr. Flanders was president of the National Machine Tool Builders Association in 1924. He is a director of the Social Science Research Council, and is a lecturer at the Tuck School of Business Administration at Dartmouth College.

James H. Herron, president, James H. Herron Company, Cleveland; Eugene W. O'Brien, editor, *Southern Power Journal*, Atlanta, Ga.; and Harry R. Westcott, president, Westcott & Mapes, Inc., New Haven, have been elected vice-presidents of the A.S.M.E.

Newly elected managers of the A.S.M.E. are B. M. Brigman, dean, Speed Scientific School, University of Louisville; Jiles W. Haney, professor of mechanical engineering, University of Nebraska; and Alfred Iddles, vice-president, United Engineers & Constructors, Inc., Philadelphia.

The American Society of Mechanical Engineers was one of the organizers of the American Engineering Standards Committee, which six years ago became the American Standards Association.

ASA Is Asked by NRA Board To Develop Grading System

Consumers' Advisory Board Wants Simple Plan to End Confusing Markings of Commodities

Conferences to Be Held with Interested Groups Under ASA Procedure; Wide Range of Interests to Be Represented

AT THE request of the Consumers' Advisory Board of the NRA, the American Standards Association will hold preliminary conferences with interested groups to study the possibilities of a model system of terms for designating grades and qualities of commodities.

This, one of the most far-reaching standardization projects ever requested of the Association, will be initiated by holding conferences with producer, consumer, advertising, distributor, and governmental groups, whose cooperation will be essential to the success of the undertaking.

Correspondence between the NRA board and the American Standards Association follows:

NATIONAL RECOVERY ADMINISTRATION
WASHINGTON, D. C.

September 11, 1934

Dr. P. G. Agnew, Executive Secretary,
American Standards Association,
29 West 39th Street, New York.

Dear Dr. Agnew:

Fair business dealing, such as is promoted by simple and meaningful grade names and designations for goods sold over the counter, is essential to the success of the NRA. "Chiseling" of quality may be more significant than "chiseling" of price since it forces the honest manufacturer to combat the competition of inferior products.

In "A Survey of the Terms Used in Designating Qualities of Goods," just completed by the Consumers' Advisory Board of the NRA, it is shown that we have today a hodge podge of contradictory and confusing grade names in most of the fields investigated. In only a few instances do the names actually indicate quality. In a majority of cases the grade names in use seriously mislead the consumer into overestimating the quality of goods, at least to the extent of one or two whole grades.

The Consumers' Advisory Board of the NRA requests the American Standards Association to develop a standard or standards for designating quality and grades of goods. An outline of the problem, based upon our survey, is attached hereto.

We believe that your organization, because of its long and successful experience in bringing together divergent opinions in effecting agreement through your clearing-house methods, is eminently equipped for this task. Our organization is prepared to take an active part in this work, because we believe that such standards would be of utmost importance to manufacturers, the trade and consumers, and further, we believe that such standards are fundamental to the success of the NRA program.

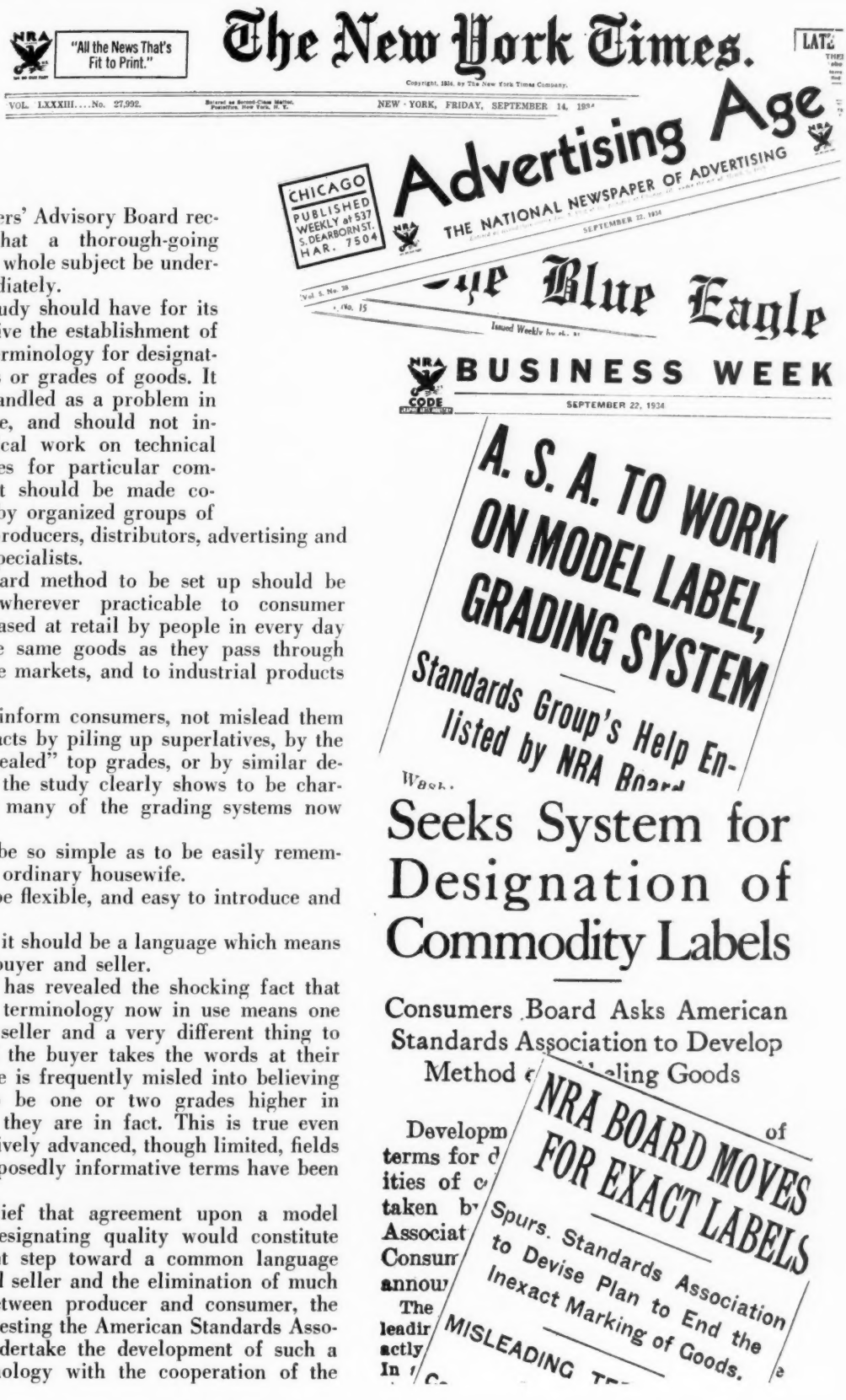
I am,
Very truly yours,
(*Signed*)
THOMAS C. BLAISDELL, JR.,
Executive Director,
Consumers' Advisory Board.

A SURVEY OF THE TERMS USED IN DESIGNATING QUALITIES OF GOODS

The following Recommendations and Summary are excerpts from a report on the above subject by the Consumers' Advisory Board of the National Recovery Administration. The report contains a comparison of the grade designations of thirty-seven groups of commodities.

Recommendations

In presenting the results of this preliminary review of the terms now in use in retail and wholesale markets to designate the quality of goods,



"All the News That's Fit to Print."

The New York Times.

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Advertising Age

THE NATIONAL NEWSPAPER OF ADVERTISING

SEPTEMBER 22, 1934

The Blue Eagle

Issued Weekly by ok.

BUSINESS WEEK

CODE

SEPTEMBER 22, 1934

A. S. A. TO WORK ON MODEL LABEL, GRADING SYSTEM

Standards Group's Help Enlisted by NRA Board

Week.

Seeks System for Designation of Commodity Labels

Consumers Board Asks American Standards Association to Develop Method ... eling Goods

Developm... of terms for d... ities of c... taken b... Associat... Consum... annou...

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NRA BOARD MOVES FOR EXACT LABELS

Spurs Standards Association to Devise Plan to End the Inexact Marking of Goods.

MISLEADING TE...

the Consumers' Advisory Board recommends that a thorough-going study of the whole subject be undertaken immediately.

Such a study should have for its main objective the establishment of a uniform terminology for designating qualities or grades of goods. It should be handled as a problem in nomenclature, and should not involve technical work on technical grading rules for particular commodities. It should be made cooperatively by organized groups of consumers, producers, distributors, advertising and marketing specialists.

The standard method to be set up should be applicable wherever practicable to consumer goods purchased at retail by people in every day life, to these same goods as they pass through the wholesale markets, and to industrial products generally.

It should inform consumers, not mislead them or conceal facts by piling up superlatives, by the use of "concealed" top grades, or by similar devices, which the study clearly shows to be characteristic of many of the grading systems now in use.

It should be so simple as to be easily remembered by the ordinary housewife.

It should be flexible, and easy to introduce and revise.

Above all, it should be a language which means the same to buyer and seller.

Our study has revealed the shocking fact that much of the terminology now in use means one thing to the seller and a very different thing to the buyer. If the buyer takes the words at their face value, he is frequently misled into believing the goods to be one or two grades higher in quality than they are in fact. This is true even in those relatively advanced, though limited, fields in which supposedly informative terms have been developed.

In the belief that agreement upon a model method of designating quality would constitute one important step toward a common language for buyer and seller and the elimination of much unfairness between producer and consumer, the Board is requesting the American Standards Association to undertake the development of such a model terminology with the cooperation of the

Caveat Emptor

NRA Board Finds Buyers and Sellers Don't Speak Same Language

The systems of terms now used to grade commodities in America "are of no value to the consumer," declares the NRA Consumers' Advisory Board, after a preliminary study of 42 separate lines.

One half of the grading terms tabulated in its report of the 42 commodities contain concealing grades. Much of the terminology now in use "means one thing to the seller and a very different thing to the buyer."

In California, for example, if Wholesaler McGillicuddy sells Retailer Schultz 50 bunches of Fancy asparagus, Schultz gets the 6th or poorest grade. If it is Extra Fancy, Schultz gets 5th best. To get the best grade, Schultz must ask for Colossal.

It would be logical to think that "No. 1" meant top grade, but in the case of potatoes U. S. No. 1 calls for 2nd grade tubers. The same thing means 3rd grade quality in the cases of peaches and cheese. And in butter, Firsts is third grade, Extras is first.

The manipulation of superlatives for raw silk evokes chortles from the novice. The Best Extra grade here is not the best extra but virtually the worst, placing 6th on the list. And Extra Extra is just one grade better. On asbestos yarn, Grade A-1 is no better than 5th grade. Silverware goes one better by making A-1 the 6th grade and XXXX the best.

Sad is the spectacle of the woman who would make sage purchases of denim overalls for her men. She has "not one scrap of evidence to indicate to her the comparative merits of 3 or 4 different garments at 3 or 4 different prices."

The board notes, sardonically enough, that not a single case has yet been found where a term has been used that might lead a consumer to *underestimate* the quality of a product. Modern advertising is held largely responsible for the confusing terminology by cultivating the popular aversion to goods specified as Seconds. American Standards Association is requested to undertake development of model grading.—***Business Week, Sept. 22.***

consumer, commercial and governmental groups concerned. . . .

Summary

1. An essential part of the language of buying and selling consists of terms used to designate quality or grade. The present study of systems of grade names has shown that the principal types of these terms are:

The letters of the alphabet—A, B, C, etc., as in the case of milk.
Numbers—1, 2, 3, 4, etc., as in coffee and fuel oils.
Words—arranged to indicate the degrees of quality such as "fancy", "choice", "standard", and "sub-standard", which are the ones applied to canned tomatoes.
There are other methods such as taking the weighted average of measured or estimated characteristics, which is known as "scoring", and other far less definitive systems.

2. Most systems are extremely complicated and decidedly irrational having "grown like Topsy". There are few clear, simple examples to be found, whether letters, numbers or names are used. (Only a handful of the systems tabulated in this report are clear and simple.)

3. Grade designations are used far more extensively in the wholesale markets and in connection with producer goods than in any other field. In most fields in which trading in the wholesale markets is based on grade designations, the use of all such grade markings and designations is sharply cut off before the goods pass across the retail counter and into the hands of the ultimate consumer, who is thus deprived of the means of discrimination which are so useful to the expert buyer though the consumer's need of such guidance is far greater.

4. There are frequently "concealed top grades", typical examples of which occur in the grades of potatoes and of cheese:

Potatoes	*Cheese*
U. S. Fancy	U. S. Extra Fancy
U. S. No. 1	U. S. Fancy
U. S. Commercial	U. S. No. 1
U. S. No. 2	U. S. No. 2
	U. S. No. 3
	Culls

On its face value "No. 1" would mean the top grade, but it actually means the second grade of potatoes and the third grade of cheese. "No. 2" which ought to be next to the top grade is actually fourth. One half of the grading terms tabulated in this report contain such concealing top grades. This results in the buyer receiving goods one or two grades lower in quality than indicated by the face value of the terms used.

5. Most grade names consist of superlatives so arranged that an uncritical consumer would be misled into thinking the products to be one or more grades higher in quality than they are. For example, the grades of raw silk and of asparagus:

Raw Silk		*Asparagus*
Special Grand	85%	Colossal
Grand X	83%	Jumbo
Special Crack	81%	Extra Select
Crack XX	78%	Select
Extra Extra	73%	Extra Fancy
Best Extra	68%	Fancy

The lowest grade dealt in on the silk exchange is termed in the trade as "Best Extra".

The lowest (6th) grade of asparagus (which is based upon size) is termed "Fancy".

Not one case has been found of a term indicating understatement of quality.

6. As pointed out in the formal recommendations of the Board, it is a shocking fact that grade names have been so built up that they mean one thing to the seller and a very different thing to the buyer, who, if he takes the words at their face value, is misled into believing the goods to be one or two grades higher in quality than they are in fact. (This is true even in those few relatively advanced fields in which consumer goods are sold at retail under definite grades.)

7. The view is widely held by commercial groups that any term which in itself indicates that a product is lower in quality than some other product is bound to be a serious deterrent to sales, since they believe that most consumers fear some stigma of inferiority from the purchase of second-, third-, or fourth-grade articles. All this clearly shows the need of a thorough investigation and airing of the whole subject.

8. The Board is recommending that such a thoroughgoing study be undertaken immediately. The study should have for its main objective the setting up of a simple model method (or methods) of designating qualities or grades of goods. It should be carried out cooperatively by organized groups of consumers, producers, distributors, advertising and marketing specialists, and governmental agencies.

The standard method to be set up should be applicable alike to consumer goods purchased at retail as well as in the wholesale markets, and to industrial products generally.

It should not mislead or conceal facts from the consumer by piling up superlatives, or by the use of concealed top grades, or by similar devices, which the study clearly shows to be characteristic of most of the schemes now in use.

It should be so simple as to be easily remembered by the ordinary housewife.

It should be flexible, and easily introduced step by step as systems of grading are set up in new fields and as old grading rules are revised.

AMERICAN STANDARDS ASSOCIATION

September 12, 1934.

Mr. Thomas C. Blaisdell, Jr.,
Executive Director,
Consumers' Advisory Board,
National Recovery Administration,
Washington, D. C.

Dear Mr. Blaisdell:

This will acknowledge your request of September 11 that the American Standards Association undertake the development of a model system of terms for designating grades and qualities of commodities.

As you know, this is an extensive and difficult undertaking. If, however, it can be carried out even in limited fields it will be of far-reaching importance in enabling consumers to know precisely what they are buying, in simplifying distribution problems, and in promoting fair dealing.

The American Standards Association will proceed promptly with the first stage of the proposed undertaking, viz: conferences with producer, consumer, distributor and governmental groups concerned, whose cooperation will be essential.

Very truly yours,

P. G. AGNEW
Secretary

Two Bureau Men Honored by French

Two members of the staff of the National Bureau of Standards, Doctors Burt H. Carroll and Donald Hubbard, were awarded the silver medal of the French Society of Photography and Cinematography as recognition of the importance of their research work on photographic emulsions. Their work, according to the report which recommended the award, has been of great benefit to French investigators and industrialists.

The program of which the research carried on by Doctors Carroll and Hubbard was a part, has been discontinued by the National Bureau of Standards due to lack of funds.

Bosch Corporation Is ASA Member

The United American Bosch Corporation, Springfield, Mass., has become a Company Member of the American Standards Association. The corporation specializes in production of high-grade magnetos of high tension type, used in connection with all types of internal combustion motors. It also manufactures and distributes radio and automotive equipment, industrial lubricators, and Diesel injection systems.

Specifications & Tests For Coal and Coke

For the first time, a compilation of all the standard and tentative specifications and tests for coal and coke, as issued by the American Society for Testing Materials, has been published. This includes five specifications, thirteen methods of test, and the standard definitions of terms relating to coal and coke.

Foundry coke and gas and coking coals are covered by specifications—and to make the pamphlet complete the recently approved requirements for classification of coal by rank and by grade developed by the Sectional Committee on Classification of Coals are included.

One of the important activities of A.S.T.M. Committee D-5 on Coal and Coke, which is sponsor of the publication, is the development of satisfactory sampling procedures. In this compilation are given the methods of laboratory sampling and analysis of coal and coke, and procedure for sampling coal; also sampling coke for analysis.

The standard tests for the cubic foot weight of coke and of crushed bituminous coal are included, as well as the methods of sieve analysis of these products, and tests for the fineness of powdered coal. The shatter and tumbler tests for coke are detailed; also the method of determining volume of cell space of lump coke and testing for size of anthracite. An important test for the agglutinating value of coal, issued in draft form for information and to elicit comment, is given.

Copies of this publication aggregating 108 pages in heavy paper cover can be obtained from A.S.T.M., 260 South Broad Street, Philadelphia. The price of one to nine copies is $1.00 each; on orders of ten or more copies special prices are quoted. Copies may be borrowed or purchased from the ASA office.

British Farmers Are Given Standard for Insecticides

British farmers, who have repeatedly requested the Ministry of Agriculture in Great Britain to require a guarantee of the amount of active materials contained in insecticides and fungicides, may now refer to standard specifications accepted by the Government Chemist, the National Farmers' Union, and the Ministry of Agriculture. Moreover, they may have the insecticide or fungicide they wish to use analyzed by a chemist in accordance with standard methods of analysis, also agreed upon, to determine whether it conforms to the standard specification.

The accepted specifications and methods of test were originally prepared by a committee of the Chamber of Horticulture in cooperation with the Board of Agriculture, but were brought up to date, with the addition of new products which have recently come into general use, by the Association of British Insecticide Manufacturers. Copper fungicides for potato-spraying, which had been especially mentioned by growers' representatives as having caused difficulty, were among the new products included.

Manufacturers Will Conform

Members of the Association of British Insecticide Manufacturers, and certain other firms, have agreed to conform to the standards, and purchasers of the insecticides and fungicides have been advised to require a guarantee that materials supplied comply with the specifications.

Chemical composition does not always give a true indication of the toxic value of chemicals in practice, an article in *Chemical Trade Journal* (London, June 22) points out in commenting on the approved specifications. Certain factors affecting the efficiency of the product, such as the physical condition of the components, cannot be defined at present, and therefore, the article continues, specifications which will satisfactorily act as a guide to the efficiency of insecticides and fungicides cannot be prepared at present. However, some further advance is now possible.

Lead arsenate, lime sulphur solution, copper sulphate, Bordeaux powder, Burgundy powder, Cheshunt compound, sodium potassium cyanides, formaldehydes, nicotine and nicotine sulphate, and soft soaps for spraying purposes are among the chemicals covered by the specifications.

Fabric Test Revisions Pave Way for Shrinkage Work

Revisions of General Methods of Testing Woven Textile Fabrics, which were submitted by the American Society for Testing Materials in August, have been approved as American Standard with the designation L5-1934 (A.S.T.M. D 39—34).

The revisions include a modification of the definition for crimp and an additional section covering a method of test for shrinkage of woven cotton fabrics. The latter test is a modification prepared by a joint committee of the A.S.T.M., the National Bureau of Standards, and the American Association of Textile Chemists and Colorists from procedures originally developed by the A.A.T.C.C.

The technical procedure outlined in this test is essentially the same as that given in the government standard CCC-T-191, which has been adopted by a number of trade associations in the textile field. The shrinkage test method is fundamental to work now under way looking toward the development of specifications for shrinkage of woven cotton yard goods.

Calvin Winsor Rice—1869-1934

An Appreciation of a Life of Service

By Howard Coonley

President, American Standards Association

When the work of a world leader in the advancement of engineering science is cut off suddenly and without warning, the profound loss which the whole movement has suffered comes to us as a particularly heavy blow. Such a blow has been dealt in the death of Dr. Calvin W. Rice, whose life and achievements have had far-reaching influence throughout the world.

After an active career as engineer for electrical, mining, and mechanical corporations, Dr. Rice 28 years ago became Secretary of the American Society of Mechanical Engineers. Three years later, he became Permanent Secretary of that outstanding technical society and from that vantage point, has rendered invaluable service to scientific bodies not only in this country but also abroad. Honored wherever engineers congregate, his advice has been sought and his contributions universally acclaimed.

Yet the loss of Dr. Rice will be felt perhaps more deeply by those of his associates who discovered in his philosophy the social implications of scientific advancement and its consequent relationship to human life.

He believed that engineers will ultimately develop a new sense of responsibility to society. Engineering organizations, he predicted, will in time undertake the solution of innumerable problems that have been the unfortunate and often tragic concomitants of technical progress.

". . . It is life itself that is important and not the fascinating details of its technique," he said.

Even before the founding of the American Standards Association, in which he played so important a part, Dr. Rice visualized the ultimate effectiveness of this organization in integrating industrial problems. Its technique at first, it is true, precluded the larger vision and the wider opportunity that we see today. But with an abiding faith in the ability of engineers and industrialists in working out their own problems, he led the way toward this broader and more useful goal.

As the representative of the A.S.M.E. on the Board of Directors of the American Standards Association, I feel a deep personal loss in the passing of Dr. Rice—a far-visioned and inspiring leader.

Specifications Written For Dental Cements

Recent cooperative studies, conducted at the National Bureau of Standards by the Federal Government and the American Dental Association, have resulted in the formulation of a tentative specification for Zinc Phosphate Dental Cements. The draft of this specification, prepared by the Bureau's dental laboratory, was submitted to manufacturers, dental schools, and large committee of dentists for criticism and suggestions for improvement. Subsequently, the specification was adopted by the American Dental Association as A.D.A. Tentative Specification No. 8 for Dental Cementing Medium to become effective July 1, 1935.

A preliminary report of the investigation from which this specification resulted was published in the November 1933 issue of the journal of the American Dental Association and another report will appear in the November 1934 issue of the same journal.

ASA Company Members

The New York Testing Laboratories and the J. P. Ward Foundry, Inc. have become Company Members of the American Standards Association.

Preferred Numbers

A Proposal of American Standard Series

Proposed series of Preferred Numbers recommended to be used by American industry have been developed by sectional committee Z17 of the American Standards Association. These series, meant to supersede those informally recommended in 1927 by a special committee of the Association, are published herewith for general criticism and comment, before being submitted to the Association for final approval. The proposal comprises several tables of preferred numbers, in the decimal as well as in the binary system, preceded by an Explanation (The informal recommendation of 1927 comprised decimal values exclusively).

The present proposal has also been submitted to the national standardizing bodies in foreign countries for consideration by the committee on Preferred Numbers organized under the procedure of the International Standards Association (ISA) which was scheduled to hold a meeting in Stockholm, in September 1934.

Comments on this proposal are invited and should be addressed to the American Standards Association, 29 West 39th Street, New York City. They will be referred to the sectional committee for its consideration.

The advantages of using preferred numbers were described in a paper by C. F. Hirshfeld and C. H. Berry, "Size Standardization by Preferred Numbers" (*Mechanical Engineering*, December, 1922). More recent articles on this subject are: "Experience and Suggestions Relating to the 'Preferred Numbers' System" (*Mechanical Engineering*, April, 1931);[1] "Standardization by Preferred Numbers," by R. E. Hellmund and J. I. Hommel (*American Machinist*, November 5, 1931); "Fundamentals of Standardizing Sizes and Ratings as Related to Preferred Numbers" (*Product Engineering*, September and October, 1932);[2] "Standardizing Sizes and Ratings by Means of Preferred Numbers" (*Commercial Standards Monthly*, May, 1932); "Standardization and Profits Aided by Preferred Numbers (*Electrical World*, August 18, 1934).

[1] Abstracted in *ASA Bulletin*, January, 1931.

Offers Proposal For Preferred Numbers

The Sectional Committee on Preferred Numbers (Z17) follows:

R. E. Hellmund, American Institute of Electrical Engineers, *Chairman*.

John Gaillard, American Standards Association, *Secretary*.

American Society of Mechanical Engineers, *K. H. Condit*.
American Society of Refrigerating Engineers, *E. S. H. Baars*.
Electric Light & Power Group, *Alexander Maxwell*.
Illuminating Engineering Society, *H. S. Broadbent*.
Institute of Radio Engineers, *A. F. Van Dyck*.
National Electrical Manufacturers Association, *L. F. Adams* and *Frank Thornton*.
Society of Automotive Engineers, *Dr. Benjamin Liebowitz*.
Society of Industrial Engineers, *L. P. Alford*.
Taylor Society, *Col. King Hathaway*.
ASA Telephone Group, *William Fondiller*.
National Bureau of Standards, *Edwin W. Ely*.
U. S. Navy, Bureau of Engineering.
U. S. War Department, *Maj. William B. Hardigg*.
Members-at-Large, *E. R. Hedrick and Oliver B. Zimmerman*.

Explanation of "Preferred Numbers" System

It is more or less obvious that any line of machines, apparatus, or devices should be based, at least within certain ranges, either with regard to its principal dimension or ratings, on a geometric series. This simply means that any rating in the line within certain ranges should be a fixed percentage larger than the preceding one. If this practice were followed indiscriminately, however, the natural consequence would be that a great number of different percentage figures would be used for this purpose.

[2] Abstracted in *Electrical Engineering*, January, 1932.

The "Preferred Numbers" system is an attempt to bring about a standardization of these percentage figures and it therefore establishes certain series of figures advancing by these standardized percentages, which should always be used in preference to other figures not contained in these series. This system provides the so-called "5 series," having five uniform steps of approximately 60 per cent between 1 and 10; the "10 series," having ten steps of approximately 25 per cent; the "20 series" having twenty steps of approximately 12 per cent; etc.

Mathematically, the factor by which each figure is multiplied to obtain the next higher figure has been established as follows:

For the 5 series, $\sqrt[5]{10.}$ or 1.5849
For the 10 series, $\sqrt[10]{10,}$ or 1.2589
For the 20 series, $\sqrt[20]{10,}$ or 1.1220
For the 40 series, $\sqrt[40]{10,}$ or 1.0592

Guiding Suggestions in the Use of Preferred Numbers

1. Fractional preferred numbers are intended for use chiefly in connection with linear dimensions where found desirable.

Decimal preferred numbers should preferably be used for ratings, commercial capacities such as cubic content, weights, etc.

Decimal preferred numbers should preferably be used for dimensions below .10 in. and especially in connection with gauges for raw materials in this range, also when the metric or the decimal inch system is used.

2. If both machined and raw material dimensions are involved, preferred numbers should be applied first to the machined dimensions, and to the raw material dimensions only if this can be done without economic waste.

3. In the case of mating parts, such as bolts, studs, rotating bodies, etc., and the bore in connection with which they are used, preferred numbers should be used for the internal members, but for the bore of the holes only if this can be done without handicapping the design or resulting in economic waste.

4. There are certain practical cases where the 60 per cent steps of the fundamental series are smaller than economically justified. There may also be cases where percentage increases between the 60 and 25 per cent steps or between the 25 and 12 per cent steps are desirable or necessary for some reason or other. For such cases supplementary series may be constructed by using for instance every third member in the ten series and thus obtaining a 100 per cent increase, every third member in the 20 series and thus obtaining a 40 per cent increase, etc. This results in the following possibilities:

Per Cent Increase Approx.	Steps
300	3rd Step in 5 series
150	2nd " " 5 "
100	3rd " " 10 "
60	Every " " 5 "
40	3rd " " 20 "
25	Every " " 10 "
18	3rd " " 40 "
12	Every " " 20 "
6	Every " " 40 "

All series start with 1 going up or down.

5. It is not only permissible but often desirable to pass over from one series of "Preferred Num-

PREFERRED NUMBERS — FUNDAMENTAL DECIMAL SERIES

TABLE NO. 1

1 to 10				
5 Series 60%	10 Series 25%	20 Series 12%	40 Series 6%	Values to 5 figures
1.0	1.0	1.0	1.0	10 000
			1.05	10 593
		1.10	1.10	11 220
			1.17	11 885
	1.25	1.25	1.25	12 589
			1.32	13 335
		1.4	1.40	14 125
			1.50	14 962
1.6	1.6	1.6	1.60	15 849
			1.70	16 788
		1.8	1.80	17 783
			1.90	18 836
	2.0	2.0	2.00	19 953
			2.10	21 135
		2.2	2.20	22 387
			2.35	23 714
2.5	2.5	2.5	2.50	25 119
			2 65	26 607
		2.8	2.8	28 184
			3.0	29 854
	3.2	3.2	3.2	31 623
			3.4	33 497
		3.6	3.6	35 481
			3.8	37 584
4.0	4.0	4.0	4.0	39 811
			4.2	42 170
		4.4	4.4	44 668
			4.7	47 315
	5.0	5.0	5.0	50 119
			5.3	53 088
		5.6	5.6	56 234
			6.0	59 566
6.4	6.4	6.4	6.4	63 096
			6.8	66 834
		7.2	7.2	70 795
			7.6	74 989
	8.0	8.0	8.0	79 433
			8.5	84 140
		9.0	9.0	89 125
			9.5	94 406
10.0	10.0	10.0	10.0	10 000

Preferred Numbers below 1.0 are formed by dividing the numbers between 1 and 10 by 10, 100, etc. Preferred numbers above 10 are correspondingly formed by multiplication of the numbers between 1 and 10 by 10, 100, etc.

Percentage Figures in headings are approximate averages.

bers" to an adjacent series where economical or technical considerations indicate such a course.

6. The application of Preferred Numbers is not restricted to a series of figures, but even when a few or only one value is required, this value should be chosen from the Preferred Numbers series, giving preference to the figures in the 5 series to those of the 10 series, etc.

7. Although the preferred numbers offer an excellent means to the individual manufacturer for standardizing parts and important internal dimensions of his products, the principal and most important applications of preferred numbers should be looked for in connection with figures of interest to the purchaser and user, such as gauge dimensions and sizes of materials, overall dimensions of machines, apparatus, and articles of all kinds, ratings, commercial capacities, speeds, etc.; in other words preferred numbers should be used wherever the interchangeability of goods made by different manufacturers is of interest to the user.

PREFERRED NUMBERS — FUNDAMENTAL FRACTIONAL SERIES

TABLE NO. 2

1/16 to 1			
5 Series 60%	10 Series 25%	20 Series 12%	40 Series 6%
1/16	1/16		
	5/64		
3/32	3/32	3/32	
		7/64	
	1/8	1/8	
		9/64	
5/32	5/32	5/32	
		11/64	
	3/16	3/16	3/16
			13/64
		7/32	7/32
			15/64
1/4	1/4	1/4	1/4
			17/64
		9/32	9/32
			19/64
	5/16	5/16	5/16
			21/64
		11/32	11/32
			23/64
3/8	3/8	3/8	3/8
			13/32
		7/16	7/16
			15/32
	1/2	1/2	1/2
			17/32
		9/16	9/16
			19/32
5/8	5/8	5/8	5/8
			21/32
		11/16	11/16
			23/32
	3/4	3/4	3/4
			13/16
		7/8	7/8
			15/16
1	1	1	1

Note: Between 1/16 and 3/32 the steps of the 20 and 40 series, and between 3/32 and 3/16 the steps of the 40 series are omitted, as finer gradations will seldom be used.

Percentage figures in headings are approximate averages.

TABLE NO. 3

1 to 14			
5 Series 60%	10 Series 25%	20 Series 12%	40 Series 6%
1	1	1	1
			1 1/16
		1 1/8	1 1/8
			1 3/16
	1 1/4	1 1/4	1 1/4
			1 5/16
		1 3/8	1 3/8
			1 7/16
1 1/2	1 1/2	1 1/2	1 1/2
			1 5/8
		1 3/4	1 3/4
			1 7/8
	2	2	2
			2 1/8
		2 1/4	2 1/4
			2 3/8
2 1/2	2 1/2	2 1/2	2 1/2
			2 5/8
		2 3/4	2 3/4
			2 7/8
	3	3	3
			3 1/4
		3 1/2	3 1/2
			3 3/4
4	4	4	4
			4 1/4
		4 1/2	4 1/2
			4 3/4
	5	5	5
			5 1/4
		5 1/2	5 1/2
			5 3/4
6	6	6	6
			6 1/2
		7	7
			7 1/2
	8	8	8
			8 1/2
		9	9
			9 1/2
10	10	10	10
			10 1/2
		11	11
			11 1/2
	12	12	12
			13
		14	14

Note: Above 14 the fractional preferred numbers are the same as the decimal preferred numbers, which will be multiples of the numbers shown in table No. 1.

PREFERRED NUMBERS — SUPPLEMENTARY

TABLE NO. 4

1 to 1000—Decimal Series			
1 2/3 Series 300%	3 1/3 Series 100%	6 2/3 Series 40%	13 1/3 Series 18%
1	1	1.0	1.0
			1.17
		1.4	1.4
			1.7
	2	2.0	2.0
			2.35
		2.8	2.8
			3.4
4	4	4.0	4.0
			4.7
		5.6	5.6
			6.8
	8	8	8.0
			9.5
		11	11
			13.2
16	16	16	16
			19
		22	22
			26.5
	32	32	32
			38
		44	44
			53
64	64	64	64
			76
		90	90
			105
	125	125	125
			150
		180	180
			210
250	250	250	250
			300
		360	360
			420
	500	500	500
			600
		720	720
			850
1000	1000	1000	1000

TABLE NO. 5

1/16 to 16—Fractional Series			
1 2/3 Series 300%	3 1/3 Series 100%	6 2/3 Series 40%	13 1/3 Series 18%
1/16	1/16		
	1/8	1/8	
		11/64	
1/4	1/4	1/4	1/4
			19/64
		11/32	11/32
			13/32
	1/2	1/2	1/2
			19/32
		11/16	11/16
			13/16
1	1	1	1
			1 3/16
		1 3/8	1 3/8
			1 5/8
	2	2	2
			2 3/8
		2 3/4	2 3/4
			3 1/4
4	4	4	4
			4 3/4
		5 1/2	5 1/2
			6 1/2
	8	8	8
			9 1/2
		11	11
			13
16	16	16	16

Preferred numbers below 1 of the decimal series are formed by dividing the numbers between 1 and 1000 by 1000. Preferred numbers above 1000 are formed by multiplying the numbers between 1 and 1000 by 1000.

Above 16 the fractional Preferred Numbers are the same as the decimal Preferred Numbers.

A 150% increase is obtained by using every second step in the five series, starting with 1 going up or down.

Percentage figures in headings are approximate averages.

Sees Need for Centralizing Railroad Standardization[1]

by

R. L. Lockwood

Director, Section of Purchases
Federal Coordinator of Transportation

STANDARDIZATION is commonly regarded as a comparatively recent development in business and industry, but its principles have actually been applied for more than two thousand years. The weapons and armor of Caesar's legions were fairly well standardized. It is possible to find records of Greek, Egyptian, and Assyrian weapons which show attempts at standardization. Other early records indicate that standardization was applied to bricks, tools, certain kinds of textiles, and various other commodities which were produced in considerable quantities.

In the days of individual craftsmanship, standardization could seldom reduce production cost; it was applied primarily for the sake of convenience in use, whether or not such convenience resulted in actual money savings. Its application extended steadily as populations grew and industry developed. The craftsmen's guilds set up standards of quality as well as dimension. As the quality of products improved with the growing skill of workmen, standards became more accurate. This tendency was further stimulated by the development of mechanical devices, even before the Industrial Revolution which followed the introduction of power-driven machinery in the eighteenth century.

The enormous increase in production which began with the power age resulted in accelerating standardization at a continually increasing rate. The advantages of interchangeability and convenience in use became more widely recognized, and these advantages could be measured in money value in many fields of industry and commerce. A further advantage, and one of much greater importance in numerous industries, was that of reduced cost of manufacture. As modern mass production developed, the importance of this factor became an industrial axiom. Perhaps the automobile industry presents the most conspicuous example of highly standardized products, manufactured in quantity at a fraction of the cost of nonstandardized "Custom-made" products of similar general character.

Modern standardization involves numerous functions which are not always fully understood. These functions fall into two general classes, technical and commercial. The technical functions of standardization, however, are primarily creative, while the commercial functions are primarily selective.

Technical work involves determination by engineers or other technicians of the design, materials, construction, workmanship, dimensions, and other features of an article, for the purpose of developing a standard to meet a required performance.

Commercial work involves selection from existing standards of those which are most important from a commercial standpoint. This class of work has become widely known as simplification, and in practically all cases it means reducing to a minimum the variety of different standards for a given article, process, or method. The terms "design" and "simplification" as used herein are intended to cover technical and commercial functions respectively.

Influences for and against Standardization

Considering the viewpoint of the actual user of "end products," opposition to simplification is usually in direct proportion to the degree to which style, taste, or individuality control the selection of an article or commodity. No one wants drab uniformity in clothes, furniture, or decoration. On the other hand, no sane person would claim that variety, for its own sake, is desirable

[1] Abstracted from an article "Railroad Standards" published in *Harvard Business Review*, July, 1934.

in paving bricks, water pipe, or automobile spark plugs. The real desires of users are ultimately reflected in the policies of retail and wholesale distributors, and of manufacturers. When variety is generally desired in articles for personal use, it will be and should be made available. When variety is not important to the user, there is no reason why the distributor and manufacturer should not take advanage of the economies to be gained through simplification, intelligently applied. In cases such as those mentioned above, where variety is not only unwanted but distinctly disadvantageous, a high degree of simplification can be applied for the benefit of all concerned.

Standardization Cannot Be Successful If It Is Static

A standard is valueless unless it is used, and it will not continue to be used unless it is kept abreast of new developments and changing conditions in its field. Many carefully developed standardization plans have failed dismally because the importance of this fact has not been recognized. Standardization that is static to the point of rigidity has been described as a "dead hand reaching out from the grave to strangle progress." It can do, and in too many cases has done, just that, but "dynamic" standardization encourages progress. It is kept flexible by means of periodic review, appraisal, and modification when necessary. It must first be intelligently applied, and must afterward be intelligently maintained, or it may become a liability instead of an asset. Standards which are not followed, either because they never were sound or because of obsolescence, have the same effect as laws which for any reason are not observed. They are of no value in themselves and tend to lower the value of those which are sound and up to date.

Early Standardization on the Railroad

In discussing any industry with men experienced in that industry, it is common to hear them say, "Our business is different." Usually this statement has considerable truth behind it. All businesses are different, and the transportation business is no exception. In fact the differences between transportation and other businesses are wide and fundamental. All transportation businesses are in the class of "service industries," but the service they furnish is unique. It is not only personal and commercial service, but public service as well. The railroad in turn is different from other transportation enterprises. While it is neither the oldest nor the newest form of transportation, it has been during most of its life the most important form, particularly in this country. It has represented the largest investment, the largest traffic in passengers and goods, and the largest mileage of commercial land transport routes.

For years after the first railroads were built, each was a law unto itself, as regards physical standards and methods. Not until the railroad had become established as the major transportation agency of the country was much thought given to standardization in the modern sense. Performance requirements were constantly changing; technical design was in the pioneering stage and was often crude and hastily developed, and simplification was unknown. As late as the 'fifties and 'sixties, there were numerous differences in such important features as track gauge, coupling devices, and clearances.

The first activity leading to standardization came about through the need for cooperative action in connection with car repairs, when freight cars first began to be used off their own roads. In 1867 the Master Car Builders Association was organized. In 1869 it initiated work which resulted 24 years later in the passage of the Safety Appliance Act and in the establishment of the automatic coupler. In 1868 the American Railway Master Mechanics Association was organized "for the advancement of knowledge of principles, construction, repairs, and service" to all kinds of rolling stock. In 1870 this association adopted its first standard, covering screw threads.

Standard Time, 1883

By 1872 the need for time standardization had become urgent, and in 1883 one standard time system superseded more than 50 systems previously used. The experience gained through the Time Conventions stimulated recognition of the advantages to be gained through interchange of ideas looking toward the solution of problems common to all railroads. Consolidation of the General Time Conventions with the Southern Railway Time Convention in 1886 was an important factor in bringing about the formation of the American Railway Association. Between 1884 and 1893 the associations of Master Car Builders and Master Mechanics, together with other groups of railroad men, developed standards covering train rules, per diem rules, dimensions and specifications for cars, car service rules, block signal and interlocking rules, and numerous designs and specifications for car parts and appliances.

Efforts to standardize track gauge had been made at intervals for more than twenty years. By 1875, a majority of railroad mileage was using the present standard of 4 feet 8½ inches between rails, but it was not officially adopted by the American Railway Association until 1897. The development of standard gauge is an excellent example of true simplification. It involved selecting one universal standard from among the numerous varying standards used by different railroads. As

in most successful simplification projects, selection was based on the percentage of existing use of the standard finally adopted. Railroads which were using a different gauge incurred considerable expense in making the necessary changes in track and equipment, and would not have done so unless they had seen clearly the ultimate benefits to be gained through general interchange of equipment. Today, we may regard standard gauge as a minor law of nature, but it is really the result of years of effort to bring about a physically unified system of railroad transportation.

The American Railway Association[1]

Before the turn of the century, railroad managements realized the need for a more complete and comprehensive organization for the study and disposition of the many problems which were common to all roads. The present American Railway Association was organized in 1891 for the "development and solution of problems connected with railroad management in the mutual interest of the railroad companies of America." With its affiliated organizations, it deals with practically every phase of the railroad industry, and has not only a profound influence but a considerable degree of actual authority over all the member roads. The Association is composed of eight major divisions, each covering a special field of activity. While most of the divisions are concerned to some extent with standardization activities, three of them devote a large part of their effort to such activities. Division IV, Engineering, Division V, Mechanical, and Division VI, Purchases and Stores, together with the American Railway Engineering Association and the Railway Accounting Officers Association, develop a large majority of A.R.A. standards of physical items and of methods. For practical purposes the American Railway Engineering Association and Division IV, Engineering, may be considered as a unit, although the former includes nonrailroad members. This unit is usually designated as A.R.E.A. The Freight Container Bureau and the Railway Fire Protection Association also develop standards in their special fields.

How Work is Divided

As indicated by the names of the units, the A.R.E.A. is concerned primarily with roadway, track, and structures; the Mechanical Division with locomotives, cars, shops, and other mechanical items; the Purchases and Stores Division with methods of purchasing, handling, storing, and distributing materials and supplies, and the Railway Accounting Officers Association with clerical and accounting practices.

The American Railway Association has authority to require all member roads to adhere to physical standards and standard practices promulgated under "Rules for General Interchange." Physical standards in this category cover brakes, couplers, steam and air connections, and numerous other features of equipment which must be uniform in order that locomotives and cars can be used interchangeably on all standard gauge railroads. Safety standards required by authority of the Interstate Commerce Commission and other public bodies must also be followed by all roads within their jurisdiction. Such standards cover physical items, methods, and practices, and are for the protection of railway employees and the public.

Adherence to standards other than those required for general interchange or safety is voluntary. Their use cannot be enforced by the American Railway Association or by any other existing organization of the railroads. The great majority of A.R.A. standards are in this class, and there is a wide range in the degree of adherence to them. Many standards which were originally adopted by a large majority vote, indicating a probable adherence of 90 per cent or more, show a progressive reduction in adherence after a relatively short time. In most cases, adherence falls off because a standard is not kept up to date. One road after another may develop improvements in the item or practice covered by the standard, and without some provision for periodic review, the standard soon becomes obsolete.

The Committee System

In general, the development of standards by committees of the various divisions as described above has been more successful in the field of design than in that of simplification. The committees are composed of men who have expert knowledge and long experience in their respective lines of work. In some cases they are responsible for the successful use on their railroads of the items or practices for which they develop standards. In matters involving design, they can be depended upon to work out standards which will meet given performance requirements. The establishment of performance requirements, however, often develops differences of opinion which are hard to reconcile. Leaving aside obvious differences in the requirements of different roads, due to varying conditions of climate, terrain, traffic, and other important factors, there may be considerable differences in opinion on matters which are common to all roads. Such differences may result in failure to agree, or in a compromise based on personal or railroad influence rather than on sound technical and commercial considerations.

It is not surprising that the work of A.R.A. standards committees fails to reach maximum effectiveness. On the contrary, its average degree of effectiveness is surprisingly high, in view of the

[1] Now the Association of American Railroads.

facts mentioned above and of the further fact that committee members, almost without exception, are full-time officers or employees of railroads. They must be exceptionally industrious and conscientious, as well as able, in order to accomplish results even approaching the attainable. They are sometimes handicapped by policies of their own roads over which they have no control, but which they cannot ignore. Their mental attitude toward their work is inevitably colored by the knowledge that they are not personally responsible for its success, and that no matter how good it is, it may never be recognized or made effective, even by their own roads. The effect of these conditions is reflected clearly in the length of time required to develop standards, in the unnecessary variety of standards for the same or similar items, and in the low average degree of actual adherence to a majority of A.R.A. standards other than those required for general interchange or safety.

Suggests Bureau

Judging from results obtained in many of our largest industries, a centralized Railroad Technical Bureau, to coordinate and administer all work in research, development, engineering, testing, standardization, and other allied fields, would pay for itself many times over. Even if wholly new facilities and personnel for such a Bureau were to be built up, the expense involved would be relatively lower than in other industries in which this kind of work is no more important. It would, however, be possible to make extensive use of existing facilities, and some use of personnel now employed by individual roads, to the extent that men of suitable qualifications could be spared by their own roads. Some new facilities might have to be developed, and some men brought in from outside industries, but, generally speaking, ample facilities and qualified personnel are available now, either in the railroads themselves or in outside organizations interested in some phase of the railroad business. Such organizations include equipment and supply companies, large producers of basic materials, educational institutions, and professional societies. The American Railway Association cooperates with a number of such organizations now, but not as effectively as could be done through a central Technical Bureau.

It should be possible for the American Railway Association to build up a Technical Bureau step by step, with comparatively little additional expense until it had actually begun to function. From that time on, the work should be developed in such a way that actual expenditures would be compensated by the results of activities of measurable money value. Such activities would probably be only a fraction of the total work done. Selection of directing personnel is of the utmost importance, particularly during the formative period. The administration of a Technical Bureau covering a field of such breadth and importance must be in the hands of men who possess not only broad knowledge of technical and commercial principles, but vision as well. Only such men could build an institution which would measure up to the importance of the railroad industry. A Railroad Technical Bureau should attain such importance and prestige that positions on its staff would be eagerly sought by men of outstanding ability.

Work of the Federal Coordinator

Standardization has been one of the many important subjects with which the Coordinator's office has been concerned since its establishment in June, 1933. Work in this field has been handled principally by the Section of Purchases, which has been cooperating continuously with existing organizations, including those of the American Railway Association and of equipment companies, professional groups, and others. It has made a careful study of the entire situation as regards standardization, both technical and commercial. The establishment of sound standards for physical items, methods, and processes common to all roads is of much importance in connection with certain problems of purchasing. The general purpose of the Section of Purchases is to promote economy in the selection and procurement of the physical property of the railroads, and standardization is obviously one of the most important factors in proper selection. So far, only three definite recommendations covering standards have been made by the Coordinator. One covers a standard for a 50-ton box car, developed by the Car Construction Committee and approved by the American Railway Association. The second covers rail, and recommends the adoption of not more than five standard sections, four of which have already been approved by the Association. The third recommendation covers the Simplified Invoice Form, approved by the Railway Accounting Officers Association and by the Purchases and Stores Division, A.R.A.

Recommends New Standards

The Coordinator has also recommended that standardization of rail joints and accessories be expedited, that lumber standards developed by A.R.E.A. and the Mechanical Division be brought into conformity with each other and with commercial American Lumber Standards, and that standard specifications be developed for locomotive coal on a basis of performance per dollar expended. These projects are in the hands of subject committees of the units directly concerned. A large number of other standardization projects

Troublesome "Specials" Are Becoming Fewer

"In conversation with one of our new salesmen the other day, I had a very pleasant reaction in being compelled to realize the great progress that has been made in the past several years in the standardization of screw threads.

"The everlasting trouble from 'specials' is constantly decreasing."—*Excerpt from a letter from E. M. Whiting, Vice President, Pheoll Mfg. Co.*

are being considered for future recommendation, in cases where it seems advisable to accelerate work already being carried on by subject committees, and to assist in making the results effective.

In addition to the work being done directly on standards in cooperation with A.R.A. committees, several other plans are being developed in connection with the broader aspects of a comprehensive standardization program. It is essential that existing standards be reviewed in order to appraise their value, measured by degree of adherence. A plan for establishing Regional Reviewing Boards for purchases includes identification of all A.R.A. standards on purchase orders, which will provide an exact measurement of adherence. The information thus obtained will provide a sound basis for recommendations regarding revision or elimination of existing standards, and development of new standards. In connection with information regarding prices, the money value of standards can be closely appraised.

Surveys of railroad shop equipment and methods are being carried on to determine the possible economies to be gained through replacement of obsolete equipment, improvement and standardization of practices, and consolidation of locomotive and car shops. A study of railroad practice in scheduling maintenance and repair work is also being made for the same general purposes. Similar surveys are being made of railroad storehouses, scrap handling, sorting, and reclamation plants, and of methods used in the disposition of obsolete and surplus materials.

Under the auspices of the National Research Council, a Committee on Railroads of the Science Advisory Board has been set up to study the facilities, procedure, and personnel available for railroad research, and to compare them with those of other large industries in which research is an important factor. The Committee is composed of nationally-known research scientists, and is cooperating with a committee of railroad executives in a study of possible means for utilizing scientific research to the advantage of the railroads. Among other plans, the establishment of a railway proving ground has been suggested to the committee, and its possibilities will be carefully studied. The value of an adequately equipped proving ground for the use of a central Railroad Technical Bureau can scarcely be overestimated. It should prove to be the most important single facility for developing sound standards and proving their technical and commercial value.

Bureau of Mines Names Representative on Council

The Bureau of Mines of the U.S. Department of Interior is now represented on the Standards Council of the American Standards Association. O. P. Hood is the Bureau's representative and A. C. Fieldner is his alternative.

Mr. Hood is chairman of the American Standards Association's committee on Safety Rules for Installing and Using Electrical Equipment in Coal Mines and also represents the Bureau of Mines on the committees on Safety Code for Compressed Air Machinery and Code for Pressure Piping. Mr. Fieldner is chairman of the committee on Classification of Coals and has been named to represent the American Society for Testing Materials on the proposed committee on Specifications for Clean Bituminous Coal.

Two other bureaus of the Department of Interior are represented on the Standards Council—Geological Survey, and the Bureau of Reclamation.

Bureau Tests Red Lead Paints

Five and one-half years ago a large number of steel panels painted with two coats of red-lead paints were exposed on the roof of the chemistry building at 45 deg facing south. The formulas consisted of 20, 22, 25, 28, 30, 33, 35, and 40 pounds of red lead (95 per cent grade) to 1 gallon of boiled linseed oil (no thinner or drier added). Thus far the paints have failed exactly in order of increasing amount of red lead, the first one to fail being the paint composed of 20 pounds of red lead to 1 gallon of oil. At this time (5½ years' exposure), the paint composed of 28 pounds of red lead to 1 gallon of oil has failed (rusting). The 30-, 33-, 35-, and 40-pound paints are still in good condition.—*Technical News Bulletin, National Bureau of Standards, July*, 1934.

NRA Safety and Health Standards Based on Work of ASA Committees

THERE appeared in the July issue of *Safety Engineering* provisions for industrial safety and health standards to be included in every code as directed by the National Recovery Administrator, with the approval of the Secretary of Labor.

The following standards were prepared by a committee and adopted by the Code Authority to apply to the Industrial Safety Equipment Industry and Trade as of August 1, 1934:

1. *Lighting.*

Minimum requirements for the illumination of manufacturing operations shall be in accordance with the requested regulations in Part 3 of the "Code of Lighting: Factories, Mills and other Work-Places" (A11), approved by the American Standards Association.

2. *Ventilation.*

Suitable atmospheric conditions shall be maintained in workrooms, by natural or artificial means, to avoid stagnant or vitiated air.

3. *Sanitation.*

Minimum requirements for drinking water, cleanliness of workrooms, disposal of waste, personal service rooms, toilet facilities, washing facilities, dressing rooms, and lunch rooms shall be in accordance with the provisions of the "Safety Code for Industrial Sanitation in Manufacturing Establishments" (Z4), approved by the American Standards Association.

4. *Fire Prevention and Protection.*

(*a*). All factory buildings shall be provided with at least two exits from each floor. These shall be remote from each other and be clearly marked.

(*b*). Buildings of more than two stories in height and having only one inside stairway shall be provided with an outside stairway. All wall openings along stairways or directly below them shall be protected by self-closing solid doors or wire-glass windows.

(*c*). Inside stairways should preferably be enclosed for their entire length with walls of masonry or other fire-resistive material.

(*d*). Exit doors shall remain unlocked from inside during working hours.

(*e*). Fire doors shall be kept free from all obstructions.

(*f*). Buildings constructed after the effective date of these regulations shall be provided with exits in accordance with the Building Exits Code (A9), approved by the American Standards Association.

(*g*). All factory buildings shall be provided with some means for fire extinguishment. Such equipment shall conform to the Standards of the National Fire Protection Association.

(*h*). All processes involving serious explosion and flash fire hazards shall be conducted in segregated buildings, where the equipment should be arranged so that only a few employees are exposed to the hazard at one time. Necessary tests shall be frequently made to see that the atmosphere in the room or booth does not rise to an explosive content.

(*i*). Flammable liquids having a flash-point less than 100 degrees F, in quantities exceeding 5 gallons shall be stored only in separate buildings of fire-resistive construction or in rooms of fire-resistive construction isolated from the remainder of the building by fire walls and self-closing fire doors. Flammable liquids having a flash-point less than 100 degrees F, in quantities of 5 gallons or less shall be contained only in approved Safety Cans.

(*j*). Electric wiring and equipment shall be installed in conformity with the National Electrical Code (C1), approved by the American Standards Association.

5. *Dust, Fumes, and Gases.*

All dust, fumes, and gases incident to industrial operations shall be removed at the source, and discharged in such manner that injury to persons or property is averted and no nuisance is created. When it is impossible, or impractical, to remove dust, fumes, or gases at the source, effective respiratory or mask equipment must be used by the workers affected.

6. *Contact with Poisonous or Harmful Materials or Substances.*

All workers exposed to possible external or internal contact with poisonous or other harmful material or substances shall be furnished suitable

personal protective equipment, such as gloves, boots, aprons, special garments, suitable goggles, respirators, gas masks, hoods, and shields. Where possible injury to the head or eyes is involved, the mechanical protection of such parts shall be in accordance with the "Safety Code for the Protection of the Head and Eyes of Industrial Workers" (X2), approved by the American Standards Association.

7. *Machine Guarding.*

(*a*). Minimum requirements for the safeguarding of moving parts of equipment used in the mechanical transmission of power, including prime movers, intermediate equipment, and driven machines, but excluding points of operation, shall be in accordance with the provisions of the "Safety Code for Mechanical Power Transmission Apparatus" (B15), approved by the American Standards Association.

(*b*). Points of operation of working machines shall be properly safeguarded, in every case where an efficient guard is available, not only to protect the operator but also to protect others who might come in contact with same, including careless or thoughtless persons. Hand-tools, for the purpose of eliminating hazards at points of operations, shall be provided when practical, and in such event the use of hand-tools shall be mandatory.

8. *Machines and Hand-Tools.*

(*a*). Machines shall not be operated with guards or shields removed nor when any protective equipment is not functioning properly. Employees shall be instructed to report promptly any defective machinery.

(*b*). Handles of hand-tools shall be sound, tight, and free from splinters, sharp edges, and roughness.

(*c*). The use of defective tools, such as mushroomed chisels, and wrenches with sprung jaws, is prohibited.

9. *Protective Clothing to Guard Against Physical Injuries.*

(*a*). Suitable types of protective clothing in good condition shall be worn by workers exposed to injury hazards from physical contact with materials; such as, goggles for protection against flying objects, metal splashes, injurious rays, etc.; safety hats, caps, helmets, safety shoes, or foot protectors for protection against falling objects; spats, made of leather, asbestos, or fire-resisting cloth for protection against molten metal; aprons, sleeves, and gloves made of leather, asbestos, or fire-resisting cloth for protection against excessive heat and fire; gloves and arm protectors for protection against sharp edges, splinters, etc.; rubber and protective gloves and insulating devices for protection against electric shock.

(*b*). Safety belts shall be furnished for protection against falls during dangerous overhead or underground work and while working in manholes or tank cars.

10. *Safeguarding of Other Working Equipment.*

(*a*). Minimum requirements for the installation, operation, and maintenance of electrical wiring and equipment, aside from the fire hazard, shall be in accordance with the provisions of the "National Electrical Safety Code" (C2), approved by the American Standards Association.

(*b*). Minimum requirements for the construction, operation, and maintenance of elevators, dumbwaiters, and escalators shall be in accordance with the provisions of the "Safety Code for Elevators, Dumbwaiters and Escalators" (A17), approved by the American Standards Association.

(*c*). Minimum requirements for the construction and use of ladders shall be in accordance with the provisions of the "Safety Code for the Construction, Care and Use of Ladders" (A14), approved by the American Standards Association.

11. *Housekeeping and Operating Rules.*

(*a*). Aisles and passageways shall be kept clean, and free of materials, containers, rubbish, or other obstructions. If not otherwise obvious, aisle limits shall be plainly marked.

(*b*). Foremen shall be instructed to utilize artificial light before daylight fades to the intensity of the artificial light.

(*c*). Lighting fixtures shall be cleaned often enough to keep the intensity of illumination above the prescribed minimum values. Where dependence is placed on daylight, windows shall be kept clean enough to fulfill their purpose.

(*d*). Floors and other walkway surfaces shall be kept in good repair, free from accumulations of oil and water. All dangerous projections from walkways shall be eliminated.

Standards Essential To World Leadership

With intensive standardization carried out nationally and enthusiastically adhered to, we have the most effective means of cheapening our products without sacrifice of quality.

More important, however, is the fact that this will, in turn, enable us to free our creative energies and provide the time and opportunity to devise the newer and broader things we need if we are to lead the way in world development.—R. E. W. Harrison, in *Mechanical Engineering*, August, 1934.

(*e*). Materials shall be piled so that they will not easily fall or be displaced by vibration or jolts.

(*f*). Fire extinguishers shall be kept in operable conditions, inspected at regular intervals and otherwise maintained in accordance with the standards of the National Fire Protection Association.

(*g*). Discarded material of an inflammable nature shall be placed in approved safety containers which shall be emptied at least once daily.

(*h*). Flammable material shall not be stored under stairways or other out-of-the-way places.

(*i*). Smoking shall be prohibited in all workrooms or stockrooms of any establishment in which explosives or readily combustible material is used, handled, or stored, and in other places where there is an equal fire hazard.

12. *Building Equipment and/or Construction.*

(*a*). Wall openings, floor openings, platforms, runways, and other places from which objects or persons might fall shall be equipped in conformity with the "Safety Code for Floor and Wall Openings, Railings and Toe-boards" (A12), approved by the American Standards Association.

(*b*). Where passageways are located over conveyors or moving machinery, bridges with railings shall be provided.

(*c*). On stairways, ramps, elevator landing platforms, and similar places where slipping may be especially hazardous, the walkway surface shall be provided with a non-slip surface.

(*d*). Aisles and passageways shall be sufficiently wide to permit the operation of handtrucks without likelihood of striking walls, columns, materials, or other objects.

(*e*). Sufficient space shall be provided around the individual machines or process units to allow for normal operation, adjustments, ordinary repairs, and for materials supplied, in process, or completed.

(*f*). Suitable seats, with backs where practicable, shall be provided for all workers whose duties can be performed in a sitting posture. Such seats shall be adjusted to provide comfort for the workers.

(*g*). Requirements relating to steam boilers shall be in accordance with the "Boiler Codes" of the American Society of Mechanical Engineers.

(*h*). It is recommended that machinery which might cause unusual vibration or excessive noise be mounted on foundations especially designed for the purpose, as by the use of shock-absorbing material.

13. *Instruction of Employees.*

(*a*). All employees shall be instructed in the hazards incidental to the work engaged in, both in regard to the individual and to fellow workers. Workers who are transferred to other, unaccustomed tasks shall be instructed in the hazards incidental to the new class of work.

(*b*). Workers shall be instructed in the use of and the necessity of using the personal protective equipment provided in these minimum requirements, and employers shall require the employees to use such equipment.

(*c*). Instruction and education shall be promoted through the use of classes, Bulletin Boards, and Signs.

14. *Medical Aid.*

(*a*). In every establishment where one or more persons are employed, suitable first aid equipment shall be provided, maintained, and available for use in case of injury.

(*b*). Employers shall require all employees to apply immediately for first aid treatment for all injuries sustained at work.

Conferences Harmonize Bathing Suit Differences

Following general conferences held in Philadelphia on May 25, 1934,[1] to consider possible commercial standards for Rib Knitted Bathing Suits, and Rib Knitted and Shaker Sweaters, the standing committees in charge of these projects have harmonized certain details, which have previously not been completely acceptable.

The National Bureau of Standards has circulated these recommended Commercial Standards for acceptance. Copies of the documents in mimeographed form are available from the National Bureau of Standards or from the ASA office.

[1] See INDUSTRIAL STANDARDIZATION AND COMMERCIAL STANDARDS MONTHLY, June, 1934, page 120.

List of Hypodermic Needles Simplified by Industry

A revised simplification program for Dental Hypodermic Needles has been accepted by the industry and became effective October 1. The program is identified by the Division of Simplified Practice, National Bureau of Standards, as Simplified Practice Recommendation R108-134.

Vogt Company Joins ASA

The Henry Vogt Machine Company, Louisville, manufacturers of interior fabric trimmings for automobiles and light-weight accessories for airplane bodies, have joined the American Standards Association as Company Member.

Binders Board Standards Approval Being Considered

Approval of the Commercial Standard for Binders Board (CS50-34) is now under consideration by the American Standards Association following the submittal by the Binders Board Manufacturers Association.

The project was initiated some years ago. In October 1931, at the request of the Binders Board Manufacturers Association, a general conference was called by the National Bureau of Standards to consider the proposed commercial standard which had been prepared previously by consultation between these groups. Representatives of companies and groups in the purchasing, distributing and using branches of the industry were invited to the general conference.

In accordance with recommendations of the conference, a Joint Committee of the Binders Board Manufacturers Association and the Research Committee of the Book Manufacturers Institute was set up to harmonize some unsettled requirements. Several meetings of the Joint Committee were held, and at the final meeting on April 19, 1934, it appeared that all items had been harmonized. Accordingly, circulation of the revised document to manufacturers, distributors and consumers for acceptance was recommended.

In the campaign for acceptances 460 favorable replies were received and, in the absence of active opposition, the Bureau announced on July 25, 1934, that the Commercial Standard was to be considered effective for new production as of October 1, 1934. In the list of acceptors are nine associations, including national associations of producers and consumers, as follows:

American Baptists Publication Society, Philadelphia.
American Child Health Association, New York. (in principle)
Bible Institute Colportage Association, Chicago.
Binders Board Manufacturers Association, New York.
Book Manufacturers' Institute, Inc., New York.
Employing Bookbinders of America, New York.
National Association of Book Publishers, New York.
Southern Publishing Association, Nashville.
State Historical Society of Wisconsin, Madison, Wis.

The provisions of the Commercial Standard are quite similar to the technical requirements in Specifications for Binders Board, which were adopted by the Binders Board Manufacturers Association on December 18, 1931 and have been in use by members of this producing group since that time.

Joint Project Working To Set Underwear Sizes

Continuing activities commenced some years ago, the Underwear Institute (formerly the Associated Knit Underwear Manufacturers of America) has been cooperating with the National Bureau of Standards in the development of standard sizes and measurements of underwear garments of types that are not included in the Commercial Standard for Knit Underwear—CS 33-32. The purpose of this activity is to lessen unfair competition and give greater satisfaction to the consumer by the adoption of standard sizes and measurements as a part of the industry's code under the provisions of the NRA.

The actual work of developing these new standards is being done at the Bureau by a research associate working under the Standardization Committee of the Underwear Institute. The personnel of the committee is as follows: Ralph M. Jones, Chairman; L. U. Lynt, L. Maher, J. Sinnott, Walter Powell, Lyndall Carter, John Shea, G. F. Earnshaw, J. C. Van Dyle, W. J. Ross, William Ravner, and George Traber. The Consumers' Advisory Board, NRA, has been invited to be represented at each meeting of the committee.

Standards recently developed by the industry and shortly to be considered by the Code Authority for inclusion in the industry's code include the following items among others: men's and boys' cotton sweat shirts made on underwear machines, women's and children's vests, bloomers, panties, and union suits and also new methods for measuring undergarments. The standardization committee of the industry also has under consideration proposed standards for certain other articles of undergarments and outer wearing apparel, upon which work has not been completed.

It is expected that, following a reasonable trial period of these proposed standards as part of the industry's code, the Underwear Institute will request the National Bureau of Standards to call a joint conference of manufacturers, distributors, and users of knit underwear to consider revising CS 33-32 to include these new standards and such other changes as may be found desirable.

Radio Association Joins ASA As Associate Member

The Radio Manufacturers Association is now an Associate Member-Body of the American Standards Association. The Association has been active in the work of the ASA for some time. It is represented on the committees on Classification and Designation of Surface Qualities, Radio, Electrical Measuring Instruments, Vacuum Tubes for Industrial Purposes, and Acoustical Measurements and Terminology.

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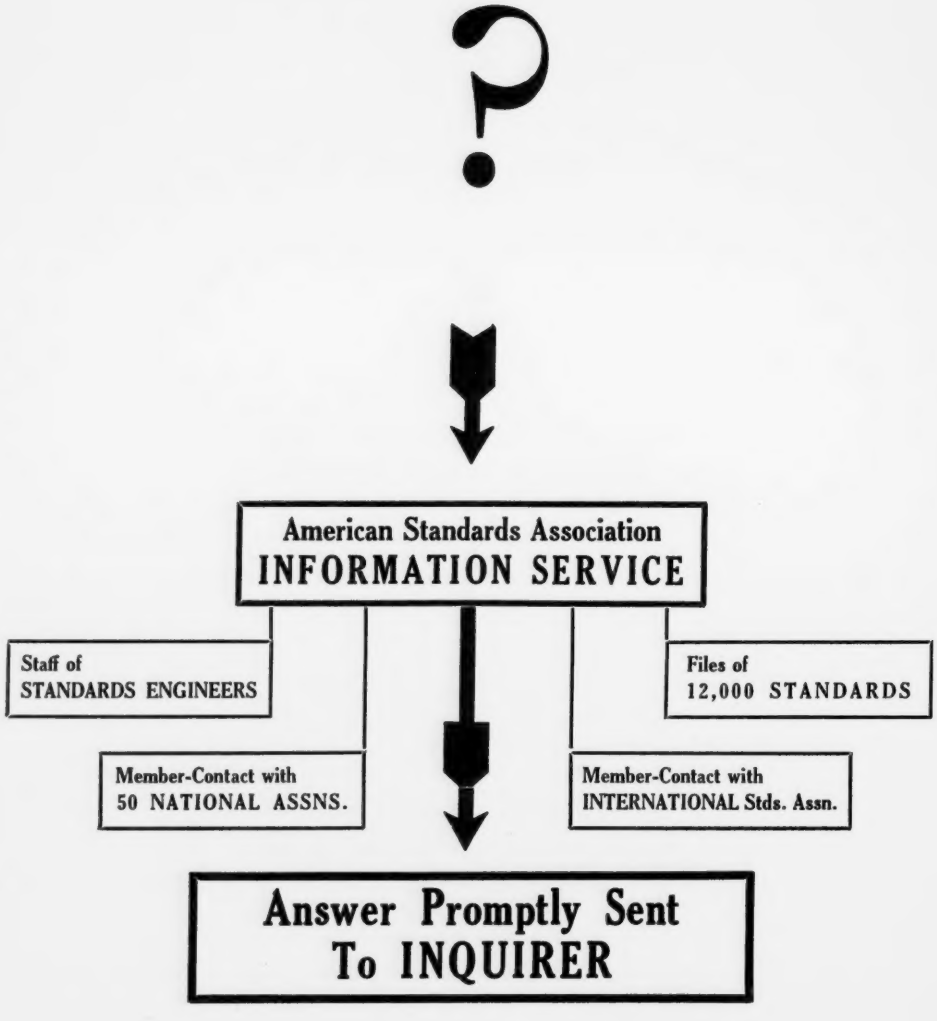

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